

# **EXHIBIT C**

# **Exhibit B**

**U.S. Pat. No. 8,407,273**  
**Claim 53**

## '273 PATENT

53. A device:

**comprising at least one first low precision high-dynamic range (LPHDR) execution unit adapted to execute a first operation on a first input signal representing a first numerical value to produce a first output signal representing a second numerical value,**

wherein the dynamic range of the possible valid inputs to the first operation is at least as wide as from 1/1,000,000 through 1,000,000 and for at least  $X=5\%$  of the possible valid inputs to the first operation, the statistical mean, over repeated execution of the first operation on each specific input from the at least  $X\%$  of the possible valid inputs to the first operation, of the numerical values represented by the first output signal of the LPHDR unit executing the first operation on that input differs by at least  $Y=0.05\%$  from the result of an exact mathematical calculation of the first operation on the numerical values of that same input;

wherein the number of LPHDR execution units in the device exceeds by at least one hundred the non-negative integer number of execution units in the device adapted to execute at least the operation of multiplication on floating point numbers that are at least 32 bits wide.

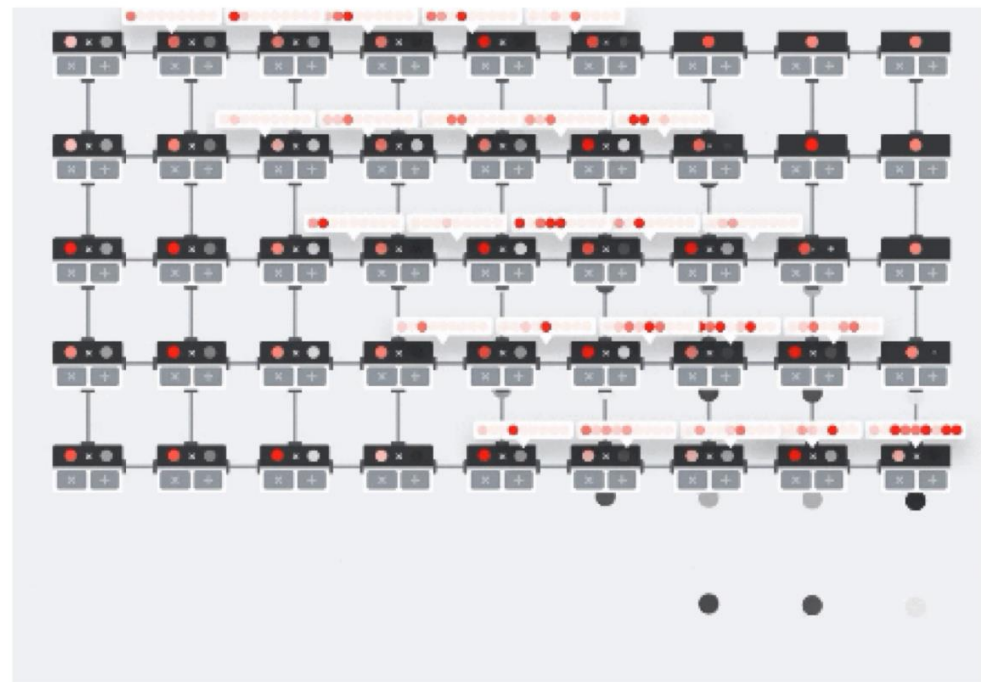
## INFRINGEMENT EVIDENCE

## Systolic array

The MXU implements matrix multiplications in hardware using a so-called "systolic array" architecture in which data elements flow through an array of hardware computation units. (In medicine, "systolic" refers to heart contractions and blood flow, here to the flow of data.)

The basic element of a matrix multiplication is a dot product between a line from one matrix and a column from the other matrix (see illustration at the top of this section). For a matrix multiplication  $Y=X*W$ , one element of the result would be:

$$Y[2,0] = X[2,0]*W[0,0] + X[2,1]*W[1,0] + X[2,2]*W[2,0] + \dots + X[2,n]*W[n,0]$$



*Illustration: the MXU systolic array. The compute elements are multiply-accumulators. The values of one matrix are loaded into the array (red dots). Values of the other matrix flow through the array (grey dots). Vertical lines propagate the values up. Horizontal lines propagate partial sums. It is left as an exercise to the user to verify that as the data flows through the array, you get the result of the matrix multiplication coming out of the right side.*

<https://codelabs.developers.google.com/codelabs/keras-flowers-convnets/#2>